JMEA 5241

J-M HEALTH, SAFETY & ENVIRONMENT PUBLICATION INFORMATION SHEET

Issue 7/30/79
2A

PUBLICATION NAME | TITLE OF ARTICLE | PAGE #

H8087

Asbestos and Smoking

editorials

More than ten years ago, THE JOURNAL published information that some cancer deaths associated with prior asbestos exposure might be related to more than asbestos alone and could be multifactorial in origin.[1] It had been found that inhalation of the mineral fibers greatly increased the already high lung cancer risk for cigarette smokers. In the group studied, it was calculated that asbestos workers who smoked cigarettes had roughly 90 times the risk for similar men who neither smoked nor worked with asbestos. In the decade since, this has been amply confirmed,[2] and the observations made provide much clinical guidance in the care and surveillance of those who have been exposed in the past and who are now in the future at risk of asbestos-associated disease.

The two most common asbestos-induced cancers are lung cancer and mesothelioma. The former is usually related to cigarette smoking; the latter is not. This dichotomy has been found for other asbestos-associated neoplasms as well. Cancer of the esophagus and laryngeal and oropharyngeal cancers occur in excess primarily in asbestos workers who have a history of cigarette smoking. On the other hand, the incidence of colorectal and renal cancers is increased whether or not the workers have smoked.

Even in the absence of cigarette smoking, asbestos increases the risk of lung cancer. This is statistically the case. But from a clinical and public health point of view, the brunt of the asbestos-lung cancer burden will, by far, be borne by the smoking asbestos workers, as the new data confirm. We followed up 12,051 asbestos insulation workers from Jan 1, 1967, through Dec 31, 1976. During this period, all had reached at least 20 years from onset of their work; many were 30, 40, or more years in their trade and, therefore, in view of asbestos' latency, were greatly at risk of asbestos-induced disease. There were 8,220 workers who had volunteered their smoking histories to us in 1967 (6,841 had a history of cigarette smoking, 1,379 did not). For comparison we analyzed, during the same period, the experience of 73,763 men in the American Cancer Society's prospective cancer prevention study.[3] These men were alike in many respects; they were white, had similar socioeconomic backgrounds, were recorded as being exposed at their work to dust, fumes, chemicals, and gases, and did not work as farmers. They had the same distribution of smoking habits. No control group is perfect, of course, but these men were as similar to the asbestos workers as we could hope to find, and, most important, their smoking habits were also known.

The statistics point the lesson. Death rates for lung cancer (per 100,000 man-years, standardized for age) were as follows: 11.3 for men who neither worked with asbestos nor smoked cigarettes, 58.4 for men who worked with asbestos but did not smoke, 122.6 for cigarette smokers who had not worked with asbestos, 601.6 for those unfortunate enough to have had both exposures—cigarettes and asbestos.

By itself does asbestos increase the risk of lung cancer? The answer is yes. But even four or five times the risk, when the base risk is low (as it is for nonsmokers in general), does not result in many cases. (Clearly, any excess is undesirable.) On the other hand, smoking itself causes a major increase, and when that high risk is then multiplied manyfold, an immense increase is found; among asbestos workers, unhappily, one in every five deaths is due to lung cancer.[4]

The newest data carry the asbestos-smoking interaction a step further—to increased risk of death of asbestosis. Again, asbestos exposure by itself carries the risk of fatal progressive pulmonary fibrosis. In this series, five men who never smoked cigarettes died of asbestosis. But the asbestosis mortality for men who smoked a pack or more a day was 2.8 times as high as the asbestosis mortality for men who never smoked regularly. Smoking, with its own bronchitis, emphysema, and fibrosis, adds an undesirable and sometimes unsupportable burden to the asbestos-induced pneumoconiosis.

Is the situation as hopeless as it appears? Are we doomed prisoners of our legacy of past inhalation (and retention) of asbestos? Not entirely. The same decade of study that provided the foregoing sober estimates has also taught us something else. In 1967, there were 2,201 men who told us that while they had smoked, they had stopped (4,472 were still smoking). During the next ten years, the lung cancer mortalities were approximately one third for those who stopped compared with those of their workmates who had continued to smoke. This experience is similar to those of smokers in general—cessation is followed by notable reversal of risk.

The clinical course is clear. All workers known to have been exposed to asbestos in the past, whether in shipyards, insulation work, factories, construction trades, brake repair, maintenance work, or otherwise, should be advised never to smoke or, if they are smoking, to stop as soon as possible. Periodic medical surveillance will add to further lessening of their risk of gastrointestinal, oropharyngeal, laryngeal, and renal cancer, and therapy for superimposed pulmonary infections will limit the toll of asbestosis. Mesothelioma, unfortunately, will not be at all affected.

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1. Selikoff IJ, Hammond EC, Churg J. Asbestos exposure, smoking and neoplasia. *JAMA* 204:106-112, 1968.

2. Hammond EC, Selikoff IJ, Seidman H: Asbestos exposure, cigarette smoking and death rates. *Ann NY Acad Sci*, to be published.

3. Hammond EC. Smoking in relation to the death rates of 1 million men and women, in *Epidemiological Study of Cancer and Other Chronic Diseases*, monograph 19. Bethesda, Md, National Cancer Institute, 1966, pp 127-204.

4. Selikoff IJ, Hammond EC, Seidman H: Mortality experience of insulation workers in the United States and Canada, 1943-1976. *Ann NY Acad Sci*, to be published.

Address editorial communications to the Editor, 535 N Dearborn St, Chicago, IL.

HSE L4-4575 REV 5/1777

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asbestosclaims.law/library/25509/1

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3. Hammond EC: Smoking in relation to the death rates of 1 million men and women, in *Epidemiological Study of Cancer and Other Chronic Diseases*, monograph 19. Bethesda, Md, National Cancer Institute, 1966, pp 127-204.
4. Selikoff IJ, Hammond EC, Seidman H: Mortality experience of insulation workers in the United States and Canada, 1943-1976. *Ann NY Acad Sci*, to be published.

Stress

The concept of stress is not confined, as is sometimes supposed, to a description of what happens when the human organism is pushed beyond its coping capacity. The stress concept is integrally connected to the concepts of homeostasis and restoration.

Homeostasis, as conceived by Walter B. Cannon, MD, is a condition marked by an equilibrium of forces inside the human body. The concept is basically concerned with the workings of the endocrine system, but it also is intended to define a state in which all the elements and factors involved in the proper functioning of the human body are in vital balance with one another.

Restoration is the natural drive of the human body to reassert its physical and mental integrity against assault or breakdown. It is natural for the body to right itself, to resist illness, and to overcome disease when it takes hold. The human body has had 3 million years of evolutionary experience in developing a remarkable capacity for responding to all sorts of attacks against its well-being. When breakdown does occur, the body resists a final negative verdict and seeks to become whole again. This restorative process is an extension of the immunologic system but has distinct functions of its own.

Stress is the enemy of both homeostasis and restoration. Stress is what happens when the body's vital functions are subjected to wear and tear beyond their balancing capacity. Stress can have its origins in fear, hate, suppressed rage, anxiety, anguish, and frustration. It can come from overeating, overdrinking, oversmoking, too many undigested experiences, too many toxins, too much noise, too many hours on the freeway, and too much battering by bad news. In general, stress is a condition in which the factors of disturbance are greater than the factors of resistance or release.

The primary area for research in stress today is in its relationship to both homeostasis and restoration. We need to know more not just about the balancing mechanisms inside the human body but about the phenomenon of repair and the way stress is related to both. We also need to know more about the way the human mind can be potentiated to raise the stress threshold, to mediate in the autonomic nervous system, and to enhance the entire restorative process.

In research studies leading to the publication of *The Stress of Life*,[1] as well as in related research since that time, it became clearly apparent that negative emotions produce negative chemical changes in the body. It has not been so clearly established, however, that the positive emotions can produce positive chemical changes. Yet, it seems unreasonable to believe that human chemistry lacks reciprocal capabilities and functions. The connection between emotional and physical well-being seems obvious enough, but the precise reasons for it have not been probed or penetrated to the same extent as the connection between the downside emotions and homeostatic failure. Studies exist on the relationship between laughter and improved respiration, between serenity and the absence of high blood pressure, and between creativity and longevity. Yet, even as we perceive these connections, we lack solid information on the way the positive qualities make their physiological registrations.

We need additional research, too, on the entire area of self-regulation. There is a tendency on the part of the public to regard demonstrations of pain control or cardiac control on the vaudeville level. People see or read about persons—not just yogis—whose minds can cope with pain or can control bleeding, and there is a gee-whiz reaction akin to what happens when people see bears ride bicycles or when they see a woman sawed in half at the circus. Yet nothing in the field of vended magic is as arresting as new knowledge about the regulatory possibilities of mind. A new frontier in the understanding of life is being opened up. It represents one of the main challenges confronting medical science today. We need to know more about the workings of the human mind—how endorphins are manufactured and activated, how norepinephrine and serotonin interact with each other and with other chemicals in creating thought-processes, how messages from the brain are transmitted by way of the hypothalamus into the endocrine system, how the conscious intelligence produces beta waves and what functions are carried out by those waves both in activating the mind and in governing the body, and how electrical fields are created by brain energy.

An American Institute of Stress (AIS) has been created to work alongside its Canadian counterpart in the systematic pursuit of such questions. The AIS does not take a segmented view of stress; it is concerned with the areas that lead into it and out of it and, in fact, with the entire homeostasis-stress-restoration triangle. Even as it works in these areas, however, the AIS will seek to rescue the entire area of stress studies from those groups that pursue approaches that cannot be fitted into even the most liberal definition of scientific medicine.

Like other disciplines, medical science requires an open mind by its practitioners if it is to avoid stagnation. But the need to maintain an open mind on the vast array of things we know little about must not be regarded as a warrant to use random theory as a battering ram against the empirical method. An open mind will not rule theory out of hand but will proceed to responsible scrutiny and systematic evaluation. The AIS is committed to that purpose.

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1. Selye H: *The Stress of Life*. New York, McGraw-Hill Book Co Inc, 1976.